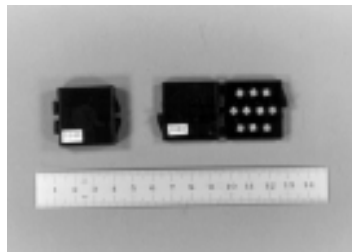
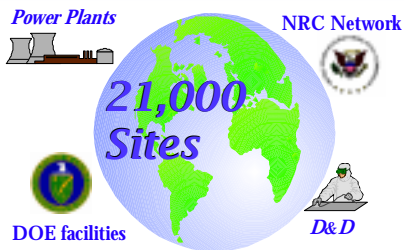


Environmental TLDs

Thermoluminescence dosimeters (TLDs) are the most widely used dosimeters for monitoring environmental radiation. There are over 21,000 sites presently being monitored with TLDs, including operating facilities and sites undergoing decommissioning.

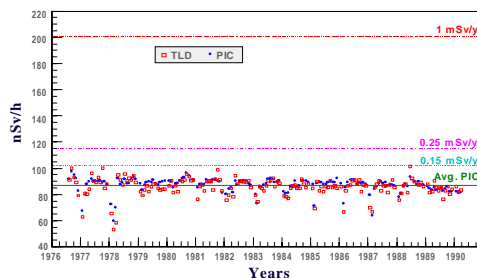


TLDs provide a measure of the cumulative radiation exposure. The individual dosimeters are small, inexpensive, and have no power requirements, making them especially useful for long term measurements over large areas.

Research & Applications

Long Term Environmental Monitoring

Dose rate data from 14 years of simultaneous monitoring with TLDs and pressurized ionization chambers (PICs) at a rural site with no local sources of contamination are plotted below. This data illustrates that TLDs can be useful to demonstrate compliance with current and proposed regulations on dose limits to the public which are indicated by dashed lines.



TLD & PIC measurements showing natural temporal variations in environmental radiation



Interim monitoring

EML is providing quarterly TLD monitoring to a DOE site awaiting decontamination as part of its interim remedy.

Research on New Methods

EML has investigated the properties of two new highly sensitive TLD materials (LiF:Mg, Cu, P, and Al₂O₃:C) for environmental applications and for use in mixed neutron-gamma fields. The Radiological Research Accelerator Facility (RARAF) at Columbia University Nevis Laboratories was used to produce essentially monoenergetic neutrons. Results on the neutron-gamma sensitivity were presented at the 11th International Conference on Solid State Dosimetry.

International Intercomparisons of Environmental Dosimeters



Purpose

- Assess state of the art in dosimetry development
- Investigate special problems
- Provide QA for participants' program
- Provide opportunities to test new dosimeters
- Assist in development of ANSI standards

Method

- Participants mail in dosimeters for:
 - LAB exposure to calibrated source
 - FIELD deployment outdoors
 - CONTROL transit and storage
 - EXTRA (special test conditions)
- Performance is measured by:
 - distribution of results
 - comparison with reference instruments
 - ANSI recommendations (N545, N13.29, N13.37)

Reference:

Klemic, G., J. Shobe, S. Sengupta, P. Shebell, K. Miller, R.T. Carolan, G. Holeman, H. Kahnhauser, "State of the Art of Environmental Dosimetry: 11th International Intercomparison and Proposed Performance Tests," (accepted for publication in Radiation Protection Dosimetry).

The International Intercomparisons of Environmental Dosimeters were initiated in 1974 to assess the performance of passive, integrating detectors in the measurement of environmental radiation and to identify and investigate special problems associated with such measurements. These intercomparisons have become a popular means for scientists to measure their techniques alongside those of their peers, and typically involve 100 participants from over 25 countries. The program is voluntary and results are reported without identifying individual participants.

Despite their widespread use, there are no requirements for testing or accreditation of environmental dosimeters, in contrast to those established for personnel dosimetry (i.e., NVLAP, DOELAP). The Intercomparison Program has served to fill this gap by providing a means of QA for environmental dosimetry programs.



Pilot testing of ANSI Draft N13.29

EML has pilot tested Draft N13.29 in collaboration with the National Institute of Standards and Technology and Brookhaven National Laboratory.

Reference:

Klemic, G., J. Shobe, S. Sengupta, P. Lamperti, C. Soares, P. Shebell, M. Monetti, F. Raccach, "Pilot Test of ANSI Draft Standard N13.29 Environmental Dosimetry- Performance Criteria for Testing," USDOE Report EML-598 (1998).

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